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# मानक

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Mazdoor Kisan Shakti Sangathan

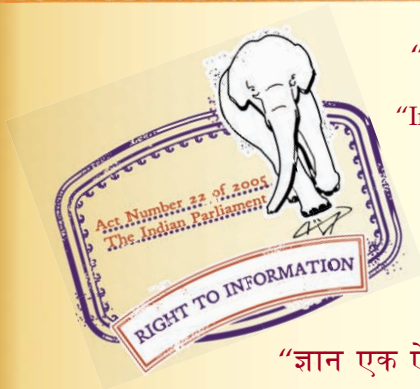
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“Step Out From the Old to the New”

IS 10144 (1982): Electronic speed limiters for diesel vehicles [ETD 18: Industrial Process Measurement and Control]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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**IS : 10144 - 1982**

(Reaffirmed 1993)

***Indian Standard***

**SPECIFICATION FOR  
ELECTRONIC SPEED LIMITERS FOR  
DIESEL VEHICLES**

(First Reprint MAY 1997)

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**BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARC.  
NEW DELHI 110002**

# *Indian Standard*

## SPECIFICATION FOR ELECTRONIC SPEED LIMITERS FOR DIESEL VEHICLES

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***Indian Standard***  
**SPECIFICATION FOR**  
**ELECTRONIC SPEED LIMITERS FOR**  
**DIESEL VEHICLES**

**0. FOREWORD**

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 16 March 1982, after the draft finalized by the Industrial Process Measurement and Control Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** Electronic speed limiter is a device fitted to diesel driven road transport vehicles to automatically limit the maximum speed, without affecting in anyway the performance parameters of the vehicle until a preset vehicle speed is reached.

**0.3** Some state governments have made the fitment of electronic speed limiters to certain classes of motor vehicles compulsory in order to meet the requirements of rules and regulations made under the Motor Vehicles Act. This standard has been prepared in order to help the manufacturers, users and the enforcing authorities to ascertain the performance requirements and methods of tests for these devices.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**1. SCOPE**

**1.1** This standard covers the requirements and methods of tests for electronic speed limiters for diesel driven road transport vehicles.

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\*Rules for rounding off numerical values (*revised*).

## 2. TERMINOLOGY

**2.0** For the purpose of this standard the following definitions shall apply.

**2.1 Electronic Speed Limiter** — A device fitted to diesel driven road transport vehicles for automatically limiting the maximum speed without affecting in anyway the performance parameters of the vehicle up to a preset vehicle speed.

NOTE — Electronic speed limiter may comprise speed sensing device like a speed pick-up unit, electronic control unit and actuator operating singly or in combination.

**2.2 Speed Sensing Device** — A device to monitor the vehicle speed and to generate an electrical signal in suitable form proportional to the vehicle speed. This electrical signal may be used as an input to the electronic control unit.

**2.3 Speed Pick-Up Unit** — A speed sensing device in which a transducer converts vehicle speed into a proportional electrical signal.

**2.4 Electronic Control Unit** — A device designed to appropriately generate command signals proportional to the electrical input signal from the speed sensing device (*see 2.2*) for operating the actuator unit and various audio and visual signals for indication to the driven

**2.5 Actuator** — A device which receives electrical command signals from the electronic control unit and operates the control linkages of the vehicle's power plant to effect the required speed control characteristics.

**2.6 Regulator** — An electromechanical or electronic device to control the main output terminal voltage within the limits required for satisfactory operation of the solid state electronic circuitry of the electronic speed limiter.

NOTE — Regulator may form an integral part of electronic control unit.

**2.7 Warning Speed** — The speed of the vehicle at which the electronic control unit initiates the audio and/or visual signals to the driver.

**2.8 Cut-Off Speed** — The speed of the vehicle at which the electronic control unit initiates command signals to the actuator unit to slow down the vehicle speed.

**2.9 Cut-in Speed** — The speed of the vehicle at which the electronic control unit de-energises the command signals to the actuator unit.

**2.10 Type Test** — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of speed limiter.



**2.11 Acceptance Tests** — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

**2.12 Routine Tests** — Tests carried out on each speed limiter to check requirements which are likely to vary during production.

### **3. GENERAL REQUIREMENTS**

#### **3.1 Material, Construction and Finish**

**3.1.1** The device shall be constructed from materials free from flaws and conforming to relevant Indian Standards wherever applicable.

**3.1.2 *Insulating and Impregnating Compounds*** — All insulating and impregnating compounds including varnishes, waxes and oils shall be suitable for the particular application for which they are intended. Under normal use and under specified tests requirements, the compound shall adequately preserve the electrical characteristics of the insulation to which it is applied by exclusion of moisture therefrom.

**3.1.3** The electronic hardware used in the system shall be able to withstand continuous and permanent exposure to open atmospheric conditions and the vibrations and high temperature present in the vehicle.

**3.1.4 *Solder*** — Wherever solder is employed it shall not be inferior to 60/40 tin-lead solder. Only non-corrosive fluxes shall be used for making electrical connections.

**3.1.5** Fasteners used in the construction shall conform to the relevant Indian Standards. It shall be suitably locked to prevent loosening due to vibration encountered in service.

**3.1.6 *Workmanship*** — Workmanship shall be in accordance with the prevalent engineering practice.

**3.1.7 *Finish*** — All metallic surfaces liable to rust and corrosion shall be suitably treated for resistance against rust and corrosion.

#### **3.2 Functional Requirements**

**3.2.1** The speed limiter when fitted shall not in any way reduce or depreciate the life or the performance of the vehicle or any part thereof at speeds below the preset limit. The actuation force of the controls should not have a detrimental effect on the drivers efficiency or the fatigue rate.

**3.2.1.1** The device shall be fail safe and so designed that in the event of a failure of the electronic speed limiter, the engine speed is not enhanced beyond the preset speed limit. Further, the vehicle shall be capable of continuing to move at a reduced speed, even in the case of total failure of the electronic speed limiter.

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**3.2.2** The unit shall be dimensioned to match with existing components and parts of the vehicle with which it has to be linked up.

**3.2.3** The device shall be sealed to prevent tampering. Any wilful damage or accidental failure of the system shall result in reduction of vehicle speed below the set limit and shall allow the vehicle to travel at a specified speed below the set speed.

**3.2.4** The sub-assemblies of the device shall be interchangeable with sub-assemblies of the same make and type.

**3.2.5 *Pre-set Speed Limits and Time Intervals*** — It shall be possible to set all preset speed limits and time intervals according to the requirements of the purchaser.

**3.2.5.1** It shall be possible to set all specified preset speed within  $\pm 5$  percent of the nominal value or  $\pm 2$  kmph whichever is greater. It shall be possible to set all specified preset time limits within  $\pm 5$  percent of the nominal value or  $\pm 5$  seconds whichever is greater.

**3.2.5.2** The unit shall have indication of normal operation when the speed of the vehicle is well within the set limit. The device shall give an audio and/or a visual warning to the driver, when vehicle speed approaches the preset speed.


The audio signal shall be clearly perceptable in the high noise levels prevalent in the drivers cabin. The visual signal shall be clearly perceivable in clear noon sunlight conditions.

**3.2.5.3** If attempted to exceed the set speed, the device shall automatically reduce the speed of the vehicle within limits specified by the manufacturers, below the set limit and then revert to normal operation.

**3.2.5.4** When specifically required by the purchaser, an over-ride facility not exceeding 100 seconds in a period of 10 minutes shall be provided in the speed limiting device.

## 4. MARKING

**4.1** Each electronic control unit shall be marked with the following information:

- a) Trade-name or name of the manufacturer;
- b) Type number and serial number;
- c) Range of setting speed;
- d) Rated voltage;
- e) The marking  with the terminal, if internally earthed;



AMENDMENT NO. 1 MARCH 1936

TO

IS:10144-1982 SPECIFICATION FOR ELECTRONIC SPEED  
LIMITERS FOR DIESEL VEHICLES

*(Page 6, clause 3.2.5.4) - Delete.*

*[Page 8, clause 6.1.1.2(f)] - Add the following  
new note after 6.1.1.2 (f):*

'NOTE - Each of three samples shall be tested for  
all the environmental tests (see 6.7 to 6.18).'

(ETDC 67)

- f) Country of manufacture; and
- g) Year of manufacture.

**4.1.1** Other units of the speed limiter shall be marked with (a) and (b) of **4.1**.

**4.1.2** Electronic speed limiter may also be marked with Standard Mark.

**4.1.2.1** The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## 5. INFORMATION TO BE SUPPLIED BY THE MANUFACTURER

**5.1** The manufacturer shall provide instruction manual or leaflets giving the operating instructions, schematic diagram, precautions in use, lists of components and any other information required for the normal operation of the electronic speed limiters.

## 6. TESTS

**6.0 General** — All the tests shall be carried out under the following standard atmospheric conditions unless special conditions are called for in the relevant tests:

Temperature	15 to 35°C
Relative humidity	45 to 75 percent
Air pressure	86 to 106 kPa

### 6.1 Classifications of Tests

**6.1.1 Type Tests** — The following shall constitute type tests:

- a) Visual examination (*see 6.2*),
- b) Power consumption test (*see 6.3*),
- c) Operating voltage range test (*see 6.4*),
- d) Functional test (*see 6.5*),
- e) Endurance test (*see 6.6*),
- f) Vibration test (*see 6.7*),
- g) Dry heat test (*see 6.8*),

- h) Gold test (*see 6.9*),
- j) Damp heat (cycling) test (*see 6.10*),
- k) Dust test (*see 6.11*),
- m) Rapid change of temperature test (*see 6.12*),
- n) Mould growth test (*see 6.13*),
- p) Bump test (*see 6.14*),
- q) Drop and topple test (*see 6.15*),
- r) Contamination resistance test (*see 6.16*),
- s) Corrosion resistance test (*see 6.17*), and
- t) Water spray test (*see 6.18*).

**6.1.1.1 Criteria for approval** — Five samples shall be submitted for testing together with relevant data. The testing authority shall issue a type approval certificate if the speed limiters are found to comply with the requirements of the tests given in **6.1.1**.

**6.1.1.2** All samples shall be tested for:

- a) Visual examination (*see 6.2*),
- b) Power consumption test (*see 6.3*),
- c) Operating voltage range test (*see 6.4*), and
- d) Functional test (*see 6.5*).

The samples shall then be subjected to tests in the following manner:

- |   |           |
|---|-----------|
| e) Endurance test ( <i>see 6.6</i> )              | 2 Samples |
| f) Environmental tests ( <i>see 6.7 to 6.18</i> ) | 3 Samples |

**6.1.1.3** In case of failure in one or more type tests, the testing authority may call for fresh samples not exceeding twice the number of original samples and subject them to test(s) in which failure occurred. If in repeat tests no failure occurs, the test(s) shall be considered to have been satisfied.

**6.1.2 Acceptance Tests** — The following shall constitute acceptance tests:

- a) Visual examination (*see 6.2*),
- b) Power consumption test (*see 6.3*),
- c) Operating voltage range test (*see 6.4*), and
- d) Functional test (*see 6.5*).

**6.1.2.1 Sampling plan and criteria for acceptance** — The number of samples for acceptance tests shall be as agreed to between the

manufacturer and the purchaser. However, a recommended plan of sampling is given in Appendix A.

**6.1.3 Routine Tests** — The following shall constitute routine tests:

- a) Visual examination (*see* 6.2), and
- b) Functional test (*see* 6.5).

**6.2 Visual Examination** — The electronic speed limiter shall be visually examined for workmanship, finish, marking and generally for relevant provisions of this standard.

**6.3 Power Consumption Test** — The speed limiters shall be connected to the rated voltage and observed for the maximum current consumption. The load current of each type of electronic speed limiter shall not exceed the values specified by the manufacturer.

**6.4 Operating Voltage Range Test** — The electronic speed limiter shall operate satisfactorily over the following voltage range:

Rated Voltage of Electronic Speed Limiter V	Performance Limits of Voltage	
	Maximum V	Minimum V
(1)	(2)	(3)
24	32	22
12	16	11
6	8	5-5

**6.5 Functional Test** — Speed transducer control unit and actuator shall be coupled and tested for the warning speed (*see* 2.7), cut-off speed (*see* 2.8) and cut-in speed (*see* 2.9). The warning speed, cut-off speed and cut-in speed shall be within  $\pm 2$  kmph of the values specified by the manufacturer.

**6.6 Endurance Test** — The electronic speed limiter shall be suitably mounted on a test rig and operated for 100 000 cycles. Each cycle shall consist of 3 seconds *ON* and 7 seconds *OFF* for the complete system.

**6.6.1** After the test, the speed limiter shall satisfy the requirements of functional test (*see* 6.5)•

## 6.7 Vibration Test

**6.7.1** The test shall be conducted as specified in IS : 2106 (Part XVI) 971\*.

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\*Environmental test for electronic and electrical equipment: Part XVI Vibration test.

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**6.7.2** Endurance test by sweeping shall be conducted according to **9.2.1** of IS : 2106 (Part XVI)-1971\* with the following severities:

Frequency range	10 to 55 Hz
Displacement amplitude	0.35 mm
Total duration	3 hours

**6.7.3** Endurance test at lesonant frequency, if exist, shall also be conducted according to **9.2.3** of IS : 2106 (Part XVI)-1971\* with the following severities:

Frequency range	10 to 55 Hz
Displacement amplitude	0.35 mm
Total duration	10 hours at each frequency

**6.7.4** After the test, the speed limiter shall satisfy the requirements of functional test (*see 6.5*).

## 6.8 Dry Heat Test

**6.8.1** The test shall be conducted as specified in IS : 9000 (Part III/ Sec 3)-1977†.

**6.8.2** The electronic speed limiter shall be exposed to a high temperature of 55°C for a period of 4 hours.

**6.8.3** At the end of the above period, while the speed limiter is still at the high temperature, it shall satisfy the requirements of functional test (*see 6.5*).

## 6.9 Cold Test

**6.9.1** The test shall be conducted as specified in IS : 9000 (Part II/ Sec 3)-1977‡.

**6.9.2** The electronic speed limiter shall be exposed to a low temperature of — 10°C for a period of 2 hours.

**6.9.3** At the end of the above period, while the speed limiter is still at the low temperature, it shall satisfy the requirments of functional test (*see 6.5*).

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\*Environmental tests for electronic and electrical equipment: Part XVI Vibration. test.

†Basic environmental testing procedures for electronic and electrical items: Part III Dry heat test, Section 3 Dry heat test for non-heat dissipating items with gradual change of temperature.

‡Basic environmental testing procedures for electronic and electrical items: Part II Cold test, Section 3 Cold test for non-heat dissipating items with gradual charge of temperature.

### 6.10 Damp Heat (Cycling) Test

**6.10.1** The test shall be conducted as specified in IS : 9000 (Part V/ Sec 2)-1981\*.

**6.10.2** The number of conditioning cycles shall be 7.

**6.10.3** After the test, the electronic speed limiter shall pass the requirements of functional test (*see* 6.5).

**6.11 Dust Test** — The electronic speed limiter with any drain holes closed, shall be mounted in its normal operating position, 150 mm from the wall in a box measuring 900 mm in all directions, containing 5 kg of fine powdered cement conforming to IS : 269-1976†. At intervals of 15 minutes, the dust shall be agitated by compressed air or fan blower by projecting blasts of air for a two-second period in a downward direction into the dust in such a way that the dust is completely and uniformly diffused throughout the entire cube. The dust shall then be allowed to settle. The test shall be continued for 5 hours.

**6.11.1** After the test, the electronic speed limiter shall pass the requirements of functional test (*see* 6.5).

### 6.12 Rapid Change of Temperature Test

**6.12.1** The test shall be conducted as specified in IS : 9000 (Part XIV)-1978‡.

**6.12.2** The speed limiter shall be exposed to the following cyclic conditions:

Cold ( <i>Min</i> ) temperature	-10°C
Hot ( <i>Max</i> ) temperature	55°C
Number of cycles	2
Duration ( $t_1$ )	30 minutes

**6.12.3** After the test, the speed limiter shall pass the requirements of functional test (*see* 6.5).

### 6.13 Mould Growth Test

**6.13.1** The test shall be conducted as specified in IS : 9000 (Part X) 1979§.

\*Basic environmental testing procedures for electronic and electrical items: Part V Damp heat (cyclic) test, Section 2 12+ 12 h cycle.

†Specification for ordinary and low heat Portland cement (*third revision*).

‡Basic environmental testing procedures for electronic and electrical items: Part XIV Change of temperature.

§Basic environmental testing procedures for electronic and electrical items: Part X Mould growth test.



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**6.13.2** The electronic speed limiter shall be subjected to mould growth for 84 days with cultures specified in **6.1** of IS : 9000 (Part X)-1979\*.

**6.13.3** After the test, the speed limiter shall show no sign of mould growth.

### 6.14 Bump Test

**6.14.1** The test shall be conducted as specified in IS : 9000 (Part VII/ Sec 2)-1979†.

**6.14.2** The condition for the test shall be as follows:

Bump severity	40 g $\pm$ 10 percent
Number of bumps	1 000

**6.14.3** After the test, the electronic speed limiter shall be visually examined for any evidence of damage and shall pass the requirements of functional test (**6.5**).

### 6.15 Drop and Topple Test

**6.15.1** The test shall be conducted as specified in IS : 9000 (Part VII/ Sec 3)-1979‡.

**6.15.2** The condition for the test shall be as follows:

Drop height	200 mm
Number of drops	6

**6.15.3** After the test, the electronic speed limiter shall be visually examined for any evidence of damage and shall pass the requirements of functional test (**6.5**).

**6.16 Contamination Resistance Test** — The electronic speed limiter with any drain holes or openings closed shall be sprayed with paraffin oil, diesel oil and lubricating oil for 60 seconds each. After each material has been sprayed, the speed limiter shall be kept in the dry heat chamber maintained at  $50 \pm 3^{\circ}\text{C}$  for 1 hour. At the end of the above period the chamber shall be switched off and the chamber temperature shall be allowed to attain the laboratory temperature. The speed limiter shall then be removed from the chamber and allowed to remain under the standard atmospheric conditions (*see 6.0*) until temperature equilibrium is reached.

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\*Basic environmental testing procedures for electronic and electrical items: Part X Mould growth test.

†Basic environmental testing procedures for electronic and electrical items: Part VII Impact test, Section 2 Bump.

‡Basic environmental testing procedures for electronic and electrical items: Part VII Impact test, Section 3 Drop and topple.

**6.16.1** After the test, the electronic speed limiter shall satisfy the requirements of functional test (6.5)

**6.17 Corrosion Resistance Test** — The test shall carried out as specified in Appendix B.

**6.17.1** After removal from salt spray, that is within 2 hours after draining and again when tested 24 hours later, the speed limiter shall satisfy the requirements of functional test (6.5). The appearance of the speed limiter shall not prejudice assessment of results.

### **6.18 Water Spray Test**

**6.18.1** The test shall be conducted as specified in IS : 2106 (Part XI)-1965\*.

**6.18.2** The duration of the test shall be 2 hours.

**6.18.3** After the test, the speed limiter shall pass the functional test (6.5).

## **A P P E N D I X A**

(Clause 6.1.2.1)

### **SAMPLING PROCEDURE FOR ACCEPTANCE TESTS**

#### **A-1. SCALE OF SAMPLING**

**A-1.1** In a consignment, all the electronic speed limiters of the same type and rating, manufactured under similar conditions of production, shall be grouped together to constitute a lot.

**A-1.2** The number of speed limiters to be selected from each lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 1.

**A-1.2.1** These speed limiters shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS : 4905-1968† may be followed.

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\*Environmental tests for electronic and electrical equipment: Part XI Water spray test.

†Methods for random sampling.

## A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

**A-2.1** The speed limiters selected according to col 1 and 2 of Table 1 shall be subjected to acceptance tests. A speed limiter failing to satisfy any of the requirements shall be termed as 'defective'. The lot shall be considered as conforming to the requirements of acceptance tests if the number of defectives found in the samples is less than or equal to the corresponding acceptance number given in col 3 of Table 1; otherwise the lot shall be rejected.

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**TABLE 1 SAMPLE SIZE AND ACCEPTANCE NUMBER**

*(Clauses A-1.2 and A-2.1)*

LOT SIZE	SAMPLE SIZE	ACCEPTANCE NUMBER
(1)	(2)	(3)
Up to 50	8	0
51 to 100	13	1
101 to 150	20	1
151 to 300	32	2
301 to 500	50	3
501 and above	80	5

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## A P P E N D I X B

*(Clause 6.17)*

### TEST FOR CORROSION RESISTANCE

#### B-1. APPARATUS

**B-1.1 Salt Spray Chamber** — The chamber for this test shall be so constructed that the salt spray is produced in the lower part of the chamber, in the upper part of which the parts to be exposed are suspended. The construction of the ceiling, walls and other parts of the chamber shall be such that no condensate can drip on the test specimen. The spray shall be produced by an atomizer employing compressed air free from all impurities.

**B-1.1.1** In general a salt spray chamber shown in Fig. 1 with a spraying arrangement as shown in Fig. 2 and complying with the following requirements would be suitable:

- a) The cabinet shall approximately be of the dimensions shown, and the cabinet and its internal fittings shall be made of monel

metal or other suitable material. A shell capable of being fitted in the upper or lower part of the cabinet shall be provided.

- b) The air used for atomizing the salt solution shall be clean. It shall be possible to adjust the pressure by a relief valve or by the pressure outlet of the blower.
- c) It shall be possible to control the amount of spray by adjusting the position of the lower nozzle *C* by unscrewing the bottom lock-nut *B*. The diameter of nozzle shall be 1.5 mm. A tap and second branch in the air-line shall be available for agitating the salt solution as required.
- d) The spraying apparatus shall be capable of atomizing not less than 1 450 ml salt solution per hour. The quantity of solution sprayed per cubic metre capacity of the chamber shall be approximately 175 ml per minute.

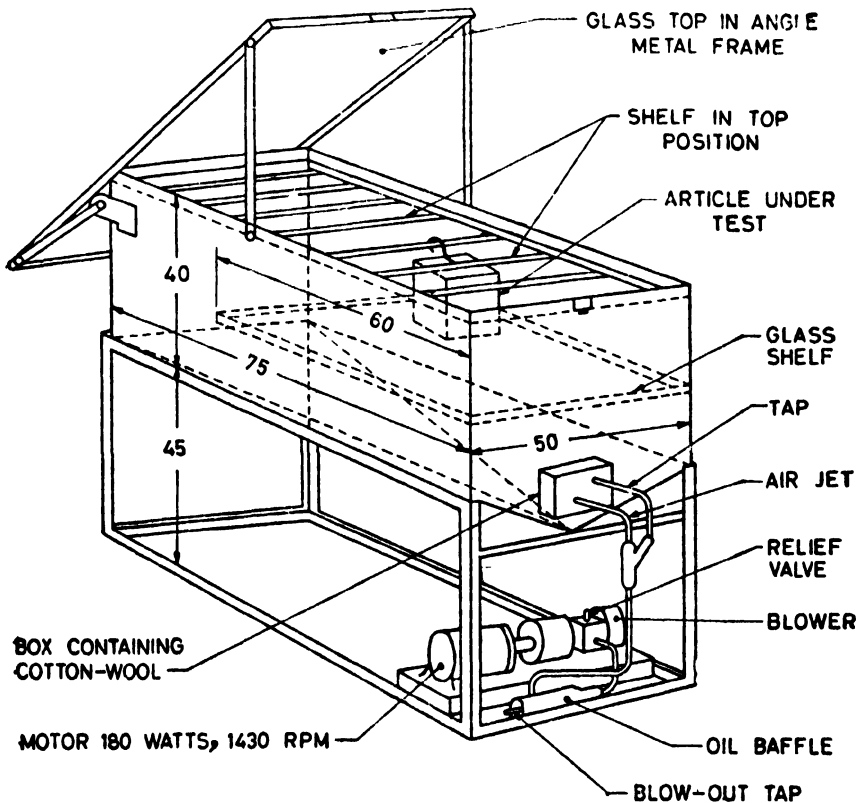


FIG. 1 SALT SPRAY CHAMBER

- e) A container filled with cotton wool shall be provided as shown in Fig. 1. It acts as a breather and provides an outlet for the air which is constantly being pumped into the chamber, the cotton wool acting as a filter and preventing salt mist from being discharged into the atmosphere.

## B-2. PROCEDURE

**B-2.1** The nozzle for atomizing the salt solution shall be adjusted for maximum amount of spray.

**B-2.2** The pressure of the solution shall be maintained between 29 and 35 kPa.

**B-2.3** The test piece shall be sprayed in the chamber with 5 percent solution of sodium chloride in water at the standard temperature of  $27 \pm 2^\circ\text{C}$  for 50 hours consisting of two periods, each period being of 24 hours of spraying and one hour of draining.

**B-2.4** After removal from the salt spray chamber, the speed limiter shall not show any sign of corrosion or electrolytic action.

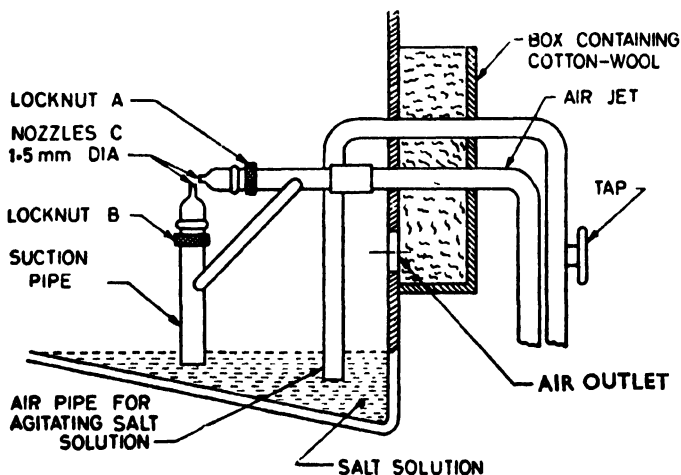


FIG. 2 DETAILS OF SPRAYING ARRANGEMENT

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